Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number	Candidate Number

Biology

Paper 2

Higher Tier

Additional Sample Assessment Material for first teaching September 2016

Time: 1 hour 45 minutes

Paper Reference

1BI0/2H

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an asterisk (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

S59009A

1/1/1/1/1/1/1/1/

S 5 9 0 0 9 A 0 1 2 8

Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Climacteric fruits are fruits that can ripen after they have been removed from the plant.

(a) (i) Which plant hormone can be used to ripen climacteric fruit?

(1)

☒ **A** auxin

☒ **B** ethene

☒ **C** gibberellin

☒ **D** insulin

(ii) When climacteric fruits ripen, they release a gas during respiration.

Which gas is released by these fruits during respiration?

(1)

☒ **A** carbon dioxide

☒ **B** carbon monoxide

☒ **C** oxygen

☒ **D** nitrogen

(b) A student investigated how temperature affects the decomposition of climacteric fruit.

The student placed a plastic box containing a banana in a water bath at 20 °C.

The student recorded the time taken for the banana to turn completely black.

This investigation was repeated at 30 °C and 40 °C.

(i) State **two** factors the student would need to control to ensure only the temperature affected the rate of decomposition of the banana.

(2)

1 .....

.....

2 .....

.....

(ii) The results of this investigation are shown in Figure 1.

temperature of water bath in °C	time taken for the banana to turn completely black in days
20	16
30	7
40	4

Figure 1

State a conclusion that could be made from these results.

(1)

.....

.....

(c) Explain why temperature affects the rate of decomposition.

(2)

.....

.....

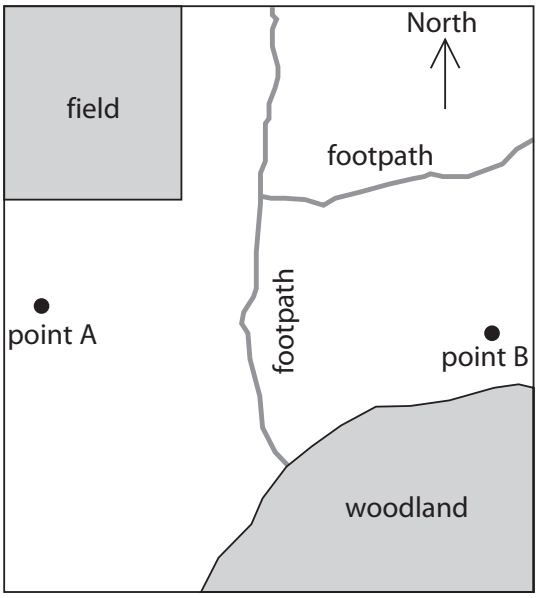
.....

.....

(Total for Question 1 = 7 marks)

2 (a) A student investigated the distribution of poppy plants in a park.

Figure 2 shows a sketch of the park and a diagram of a poppy plant.



poppy plant

Figure 2

The student placed a 1 m^2 quadrat at 10 metre intervals between point A and point B and recorded the number of poppy plants in each quadrat.

(i) Name the technique the student used to study the distribution of poppy plants.

(1)

Figure 3 shows the number of poppy plants at 10 metre intervals from point A to point B.

distance from point A in metres	number of poppy plants in the 1 m^2 quadrat
0 (point A)	12
10	10
20	11
30	8
40 (point B)	6

Figure 3

(ii) Explain the effect of the woodland on the distribution of poppy plants.

(3)

(iii) Devise a plan, that uses a quadrat, to estimate the number of poppy plants in the field.

(3)

(b) The woodland is a protected conservation area.

Explain why this woodland increases the biodiversity of the park.

(2)

(Total for Question 2 = 9 marks)

3 Figure 4 shows a peak flow meter.

A peak flow meter is used to measure the rate at which air is blown out of the lungs.

Figure 4

To use a peak flow meter a person takes a deep breath and exhales the air as hard and as fast as possible into the peak flow meter.

People with asthma can have a reduced peak flow.

A student investigated the peak flow of five people with asthma and five people without asthma.

All the people were male and the same age.

(a) Give **two** other factors the student should control when selecting the people for this investigation.

(2)

1 .....

.....

2 .....

.....

(b) The mean peak flow for people without asthma was 630 dm^3 per minute.

The mean peak flow for people with asthma was 480 dm^3 per minute.

Use the mean peak flow values to calculate the percentage decrease in peak flow for the people with asthma.

(2)

.....%

(c) Explain the effect of reduced airflow in the lungs on aerobic respiration.

(3)

.....

.....

.....

.....

.....

.....

(d) Explain why people with asthma may start to respire anaerobically more quickly than people without asthma, when exercising at the same intensity.

(2)

.....

.....

.....

.....

(Total for Question 3 = 9 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

4 (a) Tuna are carnivorous fish.

In the wild, tuna eat smaller fish called mackerel.

Mackerel eat sand eels.

Sand eels eat microscopic plant life called phytoplankton.

Sketch a pyramid of biomass for this food chain and label each level with the name of the organism.

(2)

(b) Some young tuna are kept in fish farms.

The tuna in fish farms are fed more food than they would normally catch in the wild, so they grow quickly.

When a tuna reaches 35 kg it is removed from the fish farm and sold as food.

Figure 5 shows the effect of feeding tuna different protein diets.

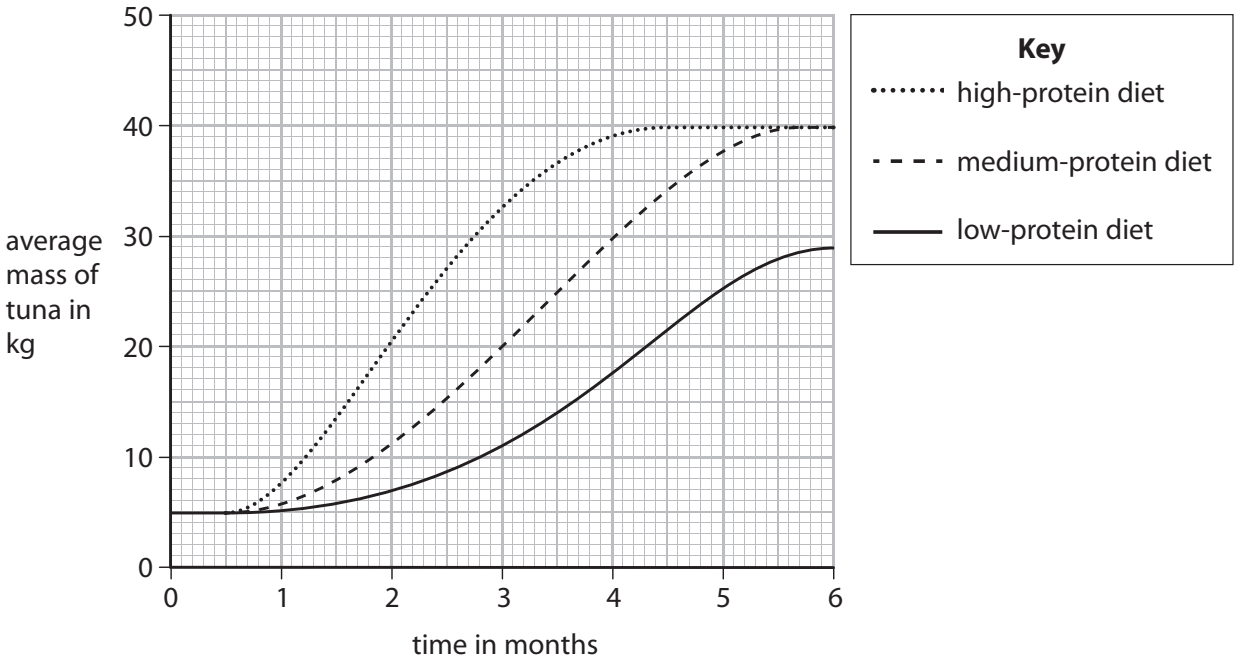


Figure 5

State and explain which diet would be given to the tuna so they can be sold in the shortest possible time.

(4)

(c) Some tuna living in the wild can grow larger than 350 kg.

When a tuna eats 1 kg of mackerel the tuna gains 60 g in mass.

Calculate the mass of mackerel a tuna would have to eat to increase its mass by 300 kg.

(2)

.....kg

(d) (i) Explain why fish farmers keep the fish confined in netted areas.

(2)

.....

.....

.....

.....

(ii) Give **one** reason why there is an increase in the number of fish farms in the world today.

(1)

.....

.....

(Total for Question 4 = 11 marks)

5 (a) A student is growing algae to make algal balls to investigate how light intensity affects photosynthesis.

A small culture of algae is added to a large bottle of distilled water.

Air is then bubbled through and the bottle is placed in front of a light source.

After 4 weeks, enough algae have grown for the student to make algal balls.

Figure 6 shows the apparatus used.

By permission of 'Science and Plants for Schools' – http://www.saps.org.uk/

Figure 6

(i) Why is air bubbled through the distilled water containing the algae?

(1)

☒ **A** to provide oxygen for photosynthesis

☒ **B** to provide carbon dioxide for photosynthesis

☒ **C** to provide carbon dioxide for respiration

☒ **D** to provide nitrogen for respiration

(ii) Which part of an algal cell absorbs light energy to make glucose?

(1)

☒ **A** the ribosome in the chloroplast

☒ **B** the chlorophyll in the vacuole

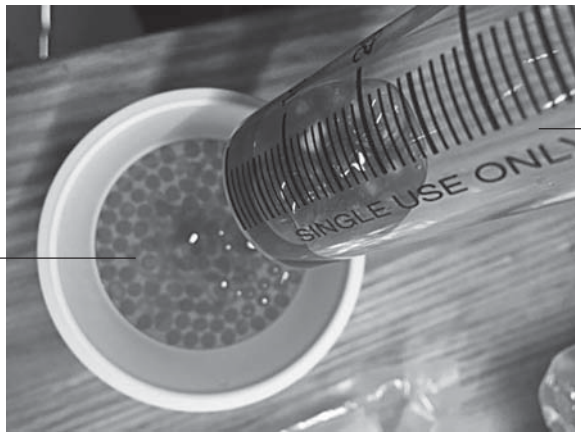
☒ **C** the chlorophyll in the chloroplast

☒ **D** the ribosome in the nucleus

(b) To make the algal balls, the algae are mixed with sodium alginate.

The student uses a syringe to add the mixture drop by drop into calcium chloride solution, which causes the algal balls to form.

Figure 7 shows this process.



Source from: https://twitter.com/mapward/status/686680082274885632

Figure 7

(i) State why the algal balls need to be washed before being used.

(1)

.....

.....

(ii) State **one** relevant safety precaution that should be used when making the algal balls.

(1)

.....

.....

(c) The student placed some algal balls into each of five small glass bottles containing hydrogencarbonate indicator.

Each bottle was sealed with a lid and placed at a different distance from a light source.

Hydrogencarbonate indicator changes colour due to the amount of carbon dioxide in the solution.

The investigation was left for 50 minutes and the colour of the hydrogencarbonate solution was recorded.

Figure 8 shows this investigation.

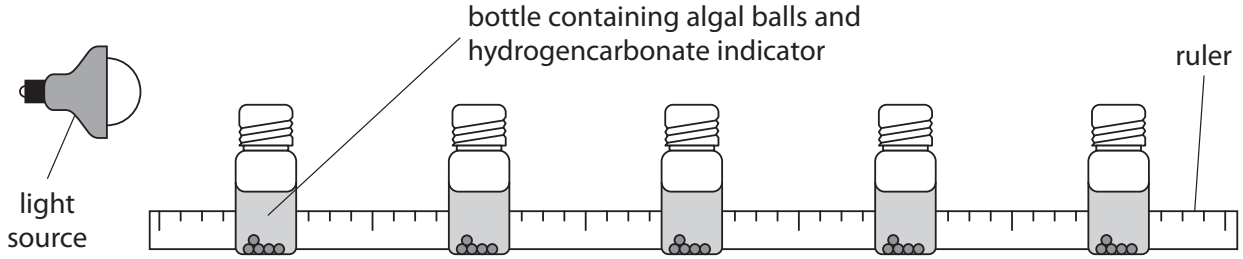


Figure 8

(i) State **two** variables the student will need to control in this investigation.

(2)

1 .....

.....

2 .....

.....

(ii) At the start of the investigation the hydrogencarbonate indicator was red in colour.

Figure 9 shows the colour of hydrogencarbonate indicator in solutions that have different pH.

colour	pH
yellow	7.6
orange	8.0
red	8.4
magenta	8.8
purple	9.2

Figure 9

Explain why the hydrogencarbonate indicator in the bottle nearest to the light source turned purple.

(3)

(Total for Question 5 = 9 marks)

6 (a) A scientist investigated the role of gibberellins in seed germination.

The scientist placed 20 cress seeds on agar jelly containing gibberellins.

The scientist counted the number of seeds that had germinated after 5 days.

Figure 10 shows the results.

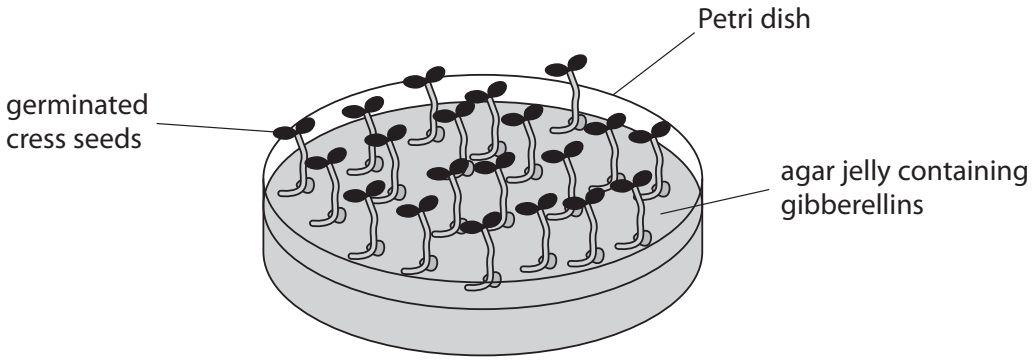


Figure 10

Explain how the scientist could use a control to improve this investigation.

(3)

.....

.....

.....

.....

.....

.....

(b) State **two** commercial uses of gibberellins not including their role in germination.

(2)

1 .....

.....

2 .....

.....

(c) (i) After germination, roots grow downwards and shoots grow upwards.

Which row of the table is correct for the growth response shown by roots and shoots?

(1)

	growth response of root	growth response of shoot
☒ **A**	positive gravitropism	positive gravitropism
☒ **B**	positive gravitropism	positive phototropism
☒ **C**	positive phototropism	positive gravitropism
☒ **D**	positive phototropism	positive phototropism

(ii) Explain how auxins can cause a plant root that is growing horizontally to grow downwards.

(3)

(Total for Question 6 = 9 marks)

7 (a) Figure 11 shows the nutritional information for two different varieties of biscuit.

Variety A

Nutrition information	Per biscuit	Per 100 g
Energy	62 kcal	446 kcal
Fat	2.1 g	15.3
of which		
monounsaturated	0.9 g	6.2 g
polyunsaturated	0.3 g	2.2 g
saturated	0.9 g	6.9 g
Carbohydrates	9.562 g	68.3 g
of which		
sugars	0 g	0.4 g
Proteins	1.113 g	7.95 g
Dietary fibre	0.53 g	3.8 g
Natrium	0.07 g	0.52 g

Variety B

Nutrition information	Per Biscuit	Per 100 g
Energy	40.8 kcal	489 kcal
Protein	0.61 g	7.30 g
Carbohydrates	5.59 g	67.10 g
(of which sugars)	1.34 g	16.10 g
Fat	1.77 g	21.20 g
Saturated fatty acids	0.89 g	10.70 g
Monounsaturated fatty acids	0.70 g	8.40 g
Polyunsaturated fatty acids	0.18 g	2.20 g
Trans fatty acids	0.00 g	0.00 g
Cholesterol	0.00 mg	0.00 mg
Dietary fibre	0.51 g	6.10 g

Figure 11

(i) State why it is better to compare the nutritional information per 100 g of biscuit rather than per biscuit.

(1)

.....

.....

(ii) Explain why variety A would be a better choice of biscuit for a person with type 2 diabetes.

(2)

.....

.....

.....

.....

.....

.....

(b) Explain the role of glucagon in the body.

(3)

(c) (i) Explain how chewing food helps digestion.

(2)

(ii) In the small intestine, large fat droplets are broken into smaller droplets by a substance called bile.

Explain how the smaller fat droplets are then digested and enter the bloodstream.

(3)

(Total for Question 7 = 11 marks)

8 (a) (i) The volume of fluid filtered through the kidneys of a person in a day was 172 dm^3.

The volume of urine produced by that person in the same day was 1.4 dm^3.

Calculate the percentage of water reabsorbed into the body of that person for that day.

Give your answer to two decimal places.

(3)

.....%

(ii) A person drank the same volume of water on two consecutive days.

The second day was much hotter.

State how the volume of urine produced on the second day was different from the first day.

(1)

.....

.....

(iii) Explain how water is reabsorbed from the collecting duct of the kidney.

(3)

.....

.....

.....

.....

.....

.....

*(b) Explain how glucose is reabsorbed into the blood of a person and why glucose can be found in the urine of a person with diabetes.

(6)

(Total for Question 8 = 13 marks)

9 Hormones control the menstrual cycle.

(a) (i) Which row of the table shows where the hormones LH and oestrogen are produced?

(1)

		LH	oestrogen
☒	**A**	pituitary	ovaries
☒	**B**	ovaries	pituitary
☒	**C**	ovaries	ovaries
☒	**D**	pituitary	pituitary

(ii) Figure 12 shows the body temperature and oestrogen level for a fertile woman during a 30 day menstrual cycle.

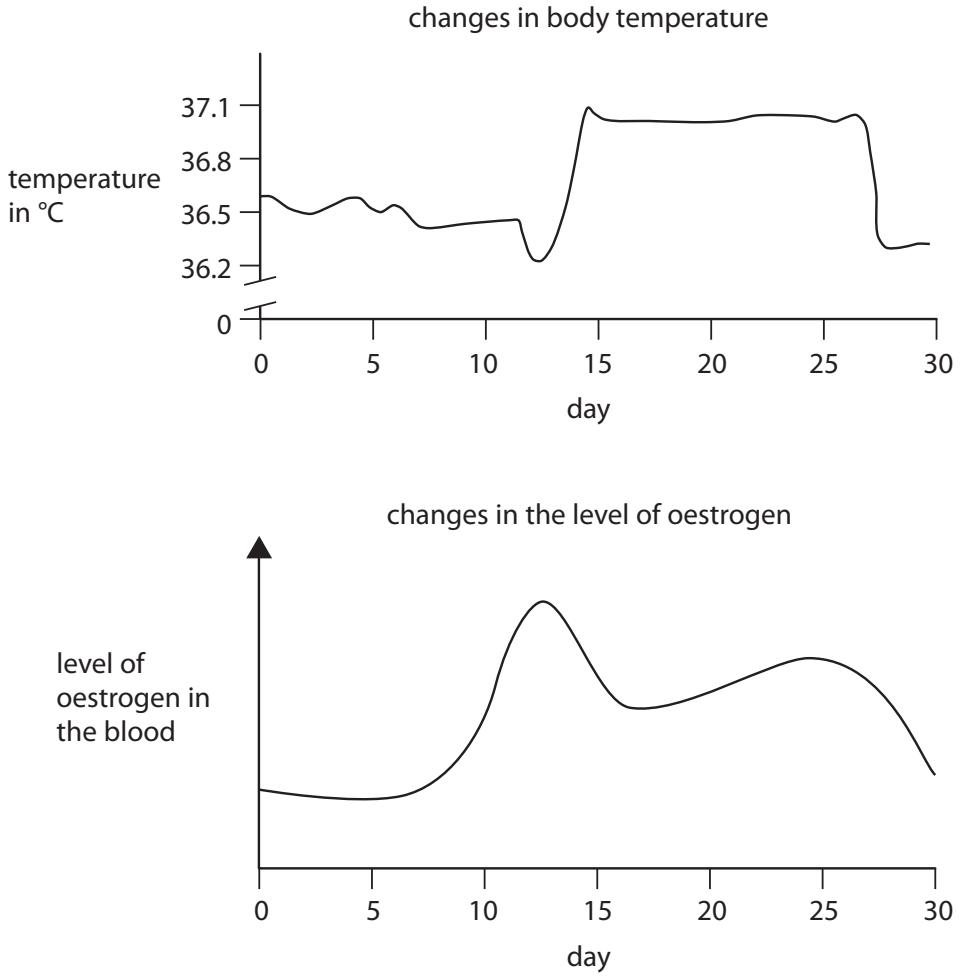


Figure 12

Describe the correlation between body temperature and oestrogen levels from day 5 to day 25.

(2)

.....

.....

.....

.....

.....

.....

(iii) Explain how monitoring a woman's body temperature can be used to increase her chance of becoming pregnant.

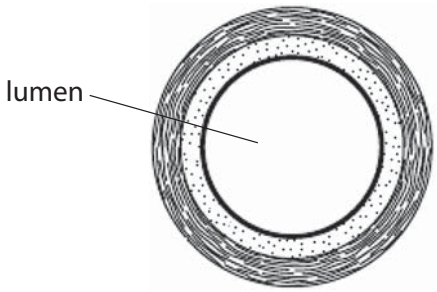
(2)

*(b) Explain how hormones control the menstrual cycle.

(6)

(Total for Question 9 = 11 marks)

10 (a) Figure 13 shows a cross-section of a blood vessel.



magnification ×8

Figure 13

(i) The diameter of the lumen in Figure 13 is 25.0 mm

What is the actual diameter of the lumen of this blood vessel?

(1)

☒ **A** 3.1×10^{-2} m

☒ **B** 3.1×10^{-3} m

☒ **C** 2.0×10^{-2} m

☒ **D** 2.0×10^{-3} m

(ii) Which blood vessel delivers deoxygenated blood to the heart?

(1)

☒ **A** aorta

☒ **B** pulmonary artery

☒ **C** pulmonary vein

☒ **D** vena cava

(iii) Capillary walls are much thinner than the wall of the blood vessel in Figure 13.

The lumen of a capillary is also much smaller.

Explain how each of these features of the capillary helps it to function efficiently.

(2)

.....

.....

.....

.....

.....

(b) The percentage of blood flowing through body organs was measured at rest and during vigorous exercise.

The results are shown in Figure 14.

body organ	blood flow at rest (%)	blood flow during vigorous exercise (%)
brain	18	4
heart	5	5
kidneys	20	1
liver	25	1
skin	7	1
muscles	15	87
other	10	1

Figure 14

(i) The volume of blood in a human is 4.7 litres.

Calculate the increase in the volume of blood flow through the muscles during vigorous exercise.

(3)

.....litres

(ii) Explain why this increase in the volume of blood to the muscles is required during vigorous exercise.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE